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ABSTRACT

This paper presents a theoretical inquiry into the potential utility of a curricular view of instruction via the heuristic vehicle of the "curriculum-in-use." It is proposed that instruction must always imply a teacher, students to be taught, a curricular subject matter to be transmitted, and an evaluative mechanism. In addition, all instruction implies a classroom, which is bounded by space, and afforded a finite amount of working time. The particular utilization of these resources constitutes the instructional work performed within a given classroom and provides the means by which the classroom as a workplace can be understood. A study of how curricular work gets done ultimately rests on how the transmission of the subject matter is managed with the instructional resources at hand. Curriculum matter is explained to be textbooks, teacher guides, and supporting materials; curriculum matter is limited by its form and content and, in a sense, is inert. Evaluative mechanisms are inert also. However, because evaluative mechanisms are the basis for obtaining feedback on the efficacy of the teacher's transmission, tests allow us to perceive a dynamic image of the subject matter to be transmitted against the reflective effectiveness of the teacher's transmission. This dynamic image is the "curriculum in-use." (MM)

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Feedback as the Crucial Variable in Conventional Instruction

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To the reader: I think it prudent to point out to the reader several terms which appear in the text of this paper which are used intentionally and consistently to denote particular curricular and instructional conce These terms include:

subject-matter-to-be-transmitted/idealized curricular ends

curricular subject-matter

evaluative mechanism/test

curriculum-in-use

I hope that this will ease the chore of negotiating yet another set of new educational terms.

Schwab's formulation of the "Practical" has certainly achieved the status of a modern curricular canon. Yet I think that it is not unfair to maintain that in assessing the impact of the "practical" on productive curricular work, the results are discouraging. The "practical" as a liturgical utterance in the form of an obligatory reference--most certainly yes; but the "practical" as a mode of thought guiding intentional curricular action hardly can be said to exist.

The purpose of this address is not to elaborate this point although I am certainly willing to defend it. Rather, I intend to propose a curricular view of instruction which I would maintain is consistent with Schwab's characterizations about the theory and practice of the practical, namely; (1) that in addressing curricular phenomena one's approach must attend to the four commonplaces--subject-matter, teacher, pupil, and milieu--thereby being defensibly pluralistic, (2) that any approach will yield only a partialized accounting of the curricular phenomena under scrutiny, (3) that the analytical framework generated by this pluralistic inquiry must also yield a potentially useful research syntax.

On the one hand, therefore, I wish to explore what one "practical" inquiry into the problem of a curricular view of instruction might entail. More particularly, it will be asserted that a framework can be delineated which constitutes a curricular approach to the matter of classroom instruction. If the image of Mark Hopkins and the log still represents the esence of educational activity, then all our educational efforts are first and foremost devoted towards the question of how we can improve the twentieth-century version of that instructional exchange. The study of curriculum enjoys a crucial role because curriculum occupies itself with the contents of this exchange. Let us be clear: this concern is not for the detached inquiry into subject-matter <u>qua</u> subject-matter which tends to reduce curriculum to a problemmatic sub-species of epistemology. It is

rather an inquiry into the ways by which we can understand the process of classroom instruction from the vantage point of the instructional transmission to pupils of a subject-matter. Because instructional action is viewed from the perspective of the transmission of a subject-matter, I characterize this inquiry as a curricular approach to instruction.

On the other hand, this inquiry is not the end to which curricular activity is directed. Curriculum is practical; it is an arena for action, a profound consideration of the character of purposive educational activity. Curricular inquiry should no less strive for an elegance in its rumination than for an efficacious research syntax which yields usable choices rather than durable insights. Both the rumination and the research syntax are important; so long as they remain disjoined one from the other, hope for better curricular activity is dashed. I will accordingly attempt to propose one such research syntax which derives from my curricular inquiry into the process of instruction.

Charles Perrow, the noted organizational sociologist, has identified what he terms "technology" to be the crucial variable in explaining variations in organizational behavior. Technology is conceived of as the "work done in an organization," the "actions that an individual performs upon an object . . . in order to make some changes in that object." Structure and goals, the other major components of an organization are, according to Perrow in large part determined by the nature of the organization's technology. Hence, it is technology, the work that is done, which is crucial.

While it seems clear that according to Perrow's scheme, the study of the technology of an organization provides the means by which organizations of different types can be compared, it may be less obvious that organizations "may vary as much within a single type as between different types." The nature of educational work is not merely the determining characteristic in distinguishing the classroom from the bakery; more importantly, the patterns of "work" performed

within an organization of a single type constitute the most concrete image of that organization for understanding variations within it.

For the purposes of schooling, this concrete image can be conceived of as instruction, implying that instruction entails a series of actions and choices, the major characteristics of which are shaped by the particular form of the work performed within the classroom. The classroom is a people-changing organization devoted to encouraging intentional learnings within pupils, the object of that change. The actions of primary interest are those which the teacher performs in order to bring about the desired educational alterations in his or her pupils.

Instructional work thereby depends on the ways in which the teacher marshalls and orders the resources of his or her workplace. Let me propose that instruction must always imply a teacher, students-to-be-taught, a curricular subject-matter and an evaluative mechanism, either formal or informal. In addition, all instruction implies a classroom or classrooms which is bounded by space and is afforded a finite amount of working time. The particular utilization of these resources constitutes the instructional work performed within a given classroom, providing the means by which the classroom as a workplace can be understood.

A curricular inquiry into instruction must focus on the subject-matter-to-be-transmitted. That is to say, the raison d'etre of curriculum as a field of inquiry is a concern for the communication of some form of a subject-matter which thereby constitutes the idealized curricular end. But while an interest in this subject-matter-to-be-transmitted thereby distinguishes curricular inquiry from the socio-psychological or economic study of the classroom, the recognition of this heuristic starting-point is not enough. Considered by itself, the subject-matter-to-be-transmitted constitutes, in Schwab's words, "the contours of a shifting and altering shadow (p. 85.)." Curriculum is an

inquiry into educational activity; as such, it must also be concerned with how one can understand the embodiments of this idealized subject-matter-to-be-transmitted within the context of the actual classroom. As a result, a study of the technological character of instruction, of how the curricular work gets done, must ultimately rest on how the transmission of this subject-matter is managed with the instructional resources at hand.

In a virtually unknown article--"Criteria for the Evaluation of Achievement Tests: From the Point of View of the Subject-Matter Specialist"--written nearly 30 years ago, Schwab characterized the classroom in a manner which closely resembles the bald outline I have just sketched. The discussion which follows is an attempt to explicate further these notions by interweaving my own current thinking on the curricular nature of instruction with those insights which Schwab offered in 1950. I hope that this joint effort will help shed light on those aspects which might otherwise remain opaque and unclear.

To begin with, it is from the shadows of the subject-matter-to-be-transmitted, as evanescent as they are, that a curriculum is conceived, taught-and-learned and evaluated. It is therefore accurate to say that the acts of conceiving, learning-and-teaching and evaluating each constitute a distinct reflection of this idealized curricular end. Following Schwab, there is both a phenomenological as well as analytical source for these reflections. Because curriculum qua phenomena is pluralistic, proper curricular inquiry must elaborate the character of that pluralism. In addition, there is also "the inevitable shadow of unreality which defaces the curriculum as a consequence of the act of analysis itself (p. 89)." Thus, it is a subtle interplay between the pluralistic character of curricular phenomena and the distinctions which arise from analytically conceiving curriculum from alternative conceptual starting points which contributes to the inevitability of these multiple reflections.

With this in mind, permit me to push forward with the task of explicating these reflections. Consider first what I call the curricular subject-matter.

By curricular subject-matter I mean the textbooks, teacher guides and supporting materials produced by the modern combination of curriculum developers and policy-setters for use by the actors present in the basic instructional setting of the classroom. While the ends potentially embodied in the subject-matter-to-be-transmitted are legion and thereby constituitive of numerous alternative curricular possibilities, these ends can be "only incompletely embodied in any single concrete object" (p. 88). The curricular subject-matter is therefore stipulatively limited by its form and content, be it a textbook or a computer screen.

As a result, the curriculum subject-matter is, in a profound sense, inert. Curricular deliberation over the form of the subject-matter-to-be-transmitted may produce extremely documented curricular materials and normative suggestions about how to transmit these contents. Such contents are, however, while supportive-not decisive-in accounting for the transmission of this subject-matter. They may help define the alternatives available to the teacher, but, as Schwab writes, "a shattering analysis is required before the purpose can be translated into a curriculum which has real existence from day to day and month to month (p.89)." To once again recall Perrow, the curricular subject-matter, while an important curricular resource, is not how the curricular work of instruction gets done.

Also inert is the evaluative mechanism qua evaluative mechanism employed. While I shall often refer to the evaluative mechanism as a test, it is recognized that the former term, being broader in conception, does better underscore the contention that some type of evaluation, be it formal or informal transpires in all instructional settings. Of the function of a test Schwab notes "that it is to hold up before the curriculum worker an informing image of his own view of those ends and of the views of them held by others (p. 87)." In other words, the test produces an alternative reflection of the subject-matter-to-be-transmitted.

Of course, the test's embodiment of these curricular ends differ from that of the curricular subject-matter both in form and content. Whereas the curricular subject-matter is discursive and in parts intentionally ambiguous or open-ended, the test tends to be precise to the extent that it is unambiguous. What it gains in clarity however it foregoes in complexity so that, paradoxically, what it achieves in definition it also loses in definition.

It follows that there is value in analytically bridging the two. As Schwab states: "The adequate communication which is the only means for improving our conception of ends of education can arise only from a great variety of embodiments of these dends (p. 87)." Thus, while neither component directly addresses the issue of instructional work, sustained inquiry into the character of these alternative reflections might produce better conceptualizations and consequent development of both.

Note: the juxtaposing of these alternative curricular reflections does not necessarily imply that an isomorphism or homomorphism is required between the two components as criterion-referenced or domain-referenced proponents maintain. Each reflection yields its own legitimate view of the idealized curricular end; to isomorphize or homomorphize the two may be less important than the clarity which the process of comparison and contrast may render. Our sharpened understanding of these curricular components of instruction may thereby underscore the notion that while "parts of the curriculum do not reconstitute the whole with which one started (p. 89)," the pluralistic nature of curriculum still demands that we improve our grasp of these parts.

Still, of greater interest is a direct answer to Perrow's basic question: how can we understand the way the instructional work gets done? The curricular subject-matter and the evaluative mechanism, as important and useful as they may be in helping us address instruction curricularly, are still "products of liesured thought and concentration whereas acts of instruction are necessarily the result

of the instant's decision (p. 88)." The teacher is him-or herself confronted with the task of forming his own reflection of the subject-matter-to-be-transmitted, shaped in part by the curricular subject-matter and the test, but further modified by the immediacy of the decisions to be made, the complexity of the human material-to-be-changed and the limited resource of time at his or her disposal. Because of the immediacy of the decision, the full humanity of the material-to-be-changed and the limited instructional time available, the teacher's reflection of his or her image of the subject-matter-to-be-transmitted is profoundly dynamic. Because of this dynamic quality, it is here that one can fundamentally confront the issue of how the curricular work of instruction in fact gets done--what I choose to call the curriculum-in-use.

Let us recall the components which I asserted were constitutive of the curricular view of instruction. The curricular subject-matter and the evaluative mechanism have been characterized as inert, partial reflections of the idealized ends of instruction. But they are clearly also vital elements in the teacher's arsenal of curricular resources. On the one hand, the essential contents of instruction are usually framed by the conents of the curricular subject-matter; these contents may be modified by the teacher but they are seldom replaced or totally rejected. On the other hand, tests are the basis for obtaining feedback on the efficacy of the teacher's transmission. In the form of results, tests allow us to set up an image of the subject-matter-to-be-transmitted against the relative effectiveness or ineffectiveness of instruction. The upshot is a dynamic reflection of curricular ends, juxtaposing the possibilities embedded in text and test against the way those possibilities are realized in a given instructional setting. This is the technological focus for the curricular view of instruction--the curriculum-in-use.

What are the technological resource or resources which the teacher in fact can deploy in effecting intentional changes in his or her students? Needless

to say, pupils are not a resource; rather they are the object to which the curricular work of instruction is directed. Further, while the curricular subject-matter and the evaluative mechanism are resources, they are not technological resources; they help delineate the conditions within which the management of instruction shall transpire but they are not by themselves under the direct managerial control of the teacher.

Let me accordingly propose that consistent with the framework which I have attempted to lay out until this point, instructional time is the crucial variable in accounting for the curricular variations in instruction. The fundamental characteristic of instruction is the way in which the teacher deploys his or her instructional time across various contents. In lieu of conceiving of instruction in terms of the psycho-socio space occupied by teachers and pupils, the curricular work of instruction centers on the manner in which the teacher deploys the instructional time available. It is the dynamic allocation of instruction time across various contents and the factors which affect the decisions of allocation rather than the efficacy of the use of a given unit of time which constitutes the essence of the way the curricular work gets done. It is this aspect of the curriculum-in-use which shall accordingly occupy our subsequent attention.

In considering the curriculum-in-use from the vantage point of the allocation of instructional time, one must admit both an analytical as well as an empirical aspect. By this I mean, the curriculum-in-use serves both as a curricular framework by which to approach analytically the issue and as well defining the sources and kinds of data which shall serve as the basis for making empirical assertions. I accordingly have sought to characterize the matter of time and the curriculum-in-use by stating a series of both analytical and empirical propositions.

From the analytical perspective, one can conceive of time and the curriculum-in-use by the following sets of propositions which I shall state and then comment on in turn.

A. There is a series of choices to be made about whether or not to allocate time to a given collection of contents.

Comment: This is akin to the question of opportunity to learn which the IEA evaluations of international achievment raised as perhaps the major curricular-instructional variable contributing to achievement variance. In the main, these are decisions made beyond the ken of the teacher, resting rather with the district or school as well with the developers of the curricular subject-matter. In fact, decisions about such exclusion or inclusion are choices about system goals which are more properly within the purview of curriculum policy. When and if, however, the choice of absolute inclusion or exclusion is made by the teacher irrespective of these other groups, it does become the first problem of time and the curriculum-in-use.

B. Assuming that a teacher has chosen to instruct a given collection of contents, he or she must address:

1. How much time will be allocated to each of these contents?
2. What level or levels of classroom achievement either formal or informal, will be desired?
3. How effective is the allocation of time in achieving that level of achievement for these content?

Comment: This set of propositions points to the contention that the teacher's reflection of the subject-matter-to-be-transmitted is colored by his or her expectations of the level of

classroom achievement. By this I mean that the feedback embedded in the curriculum-in-use is about pupil performance vis a vis the subject-matter-to-be-transmitted rather than about the curricular ends themselves. Assuming a commitment to teach a given body of contents, feedback on the efficacy of instructional time must imply a set of standards against which it can be judged. Without some notion of these desired level or levels of achievement, determinations about the quality of the change to be made within pupils are impossible.

Let me emphasize: the curricular technology of instruction is first and foremost about the quality of the product which can be obtained from the prudential use of the quantitative temporal resource. The questions raised in this set of propositions highlight this contention in terms of the interelationship between the achievement standard and the deployment of time.

C. Assuming both that time is limited and that its allocation will not be equally effective in bringing about the desired level of achievement:

1. What constraints does the curricular subject-matter place upon the teacher in seeking his or her level of achievement?
2. What is the character of the feedback available for calibrating instructional capability in the form of the deployment of time and subject-matter demands?

Comment: Unlike some formulations regarding the relationship betweeen time and achievement (such as Glaser and Bloom), the curricular view of instruction stipulates that the

character of the curricular subject-matter varies in its responsiveness to the instructional allocation of time. This stipulation follows from my assertion that while the curricular subject-matter and the evaluative mechanism do not constitute instructional resources to-be-managed, they do serve to constrain the ways in which time can be effectively allocated. More specifically, it is maintained that the effect of time on achievement will differ depending on the specific contents taught. Not all subject-matters are hierarchial, not all learning is cumulative and not all time is equally effective given similar pupils and teachers.

The upshot of these contentions is that without a consideration of the curricular subject-matter and evaluative mechanism, feedback on the efficacy of the allocation of time is technologically inadequate. Feedback on the deployment of time implies statements both about the quality of the educational changes heretofore made as well as suggestions about subsequent changes. While the instructional means for effecting these past and future changes remains the teacher's allocation of time, the conditions within which that deployment is performed can be understood only by considering all the components which constitute the curricular view of instruction.

While I would not presume to identify all the possible empirical questions which can properly be raised about the curriculum-in-use, several general issues can be suggested:

A) How can we interpret test data whose variance is less than can be maximally be obtained from a standardized, norm-referenced instrument but which its greater than that posited for a criterion-referenced test?

B) Following from this, how can we make use of item data, such as item difficulty and item discrimination as well as test score distributions for various domains of content?

C) How can the effect of instructional time on achievement in various domains and sub-domains be understood?

D) How can an analysis of the curricular components of variance reveal the structure of instructional behavior contribution to performance variance?

1. In particular, what is the magnitude of the item and teacher or pupil-teacher by item components?

This list could obviously be extended, and if time remains, I would be pleased to discuss some additional empirical propositions about the curriculum-in-use which I am currently raising in my dissertation research. However, I think it more useful at this moment to consider aspects of the first three empirical issues raised in the context of a small study which I performed, leaving aside the issue of components of variance analysis. At the outset of my brief summary, please understand that the study was intended to address the question of what empirical techniques might be useful in exploring the curriculum-in-use rather than to champion the generalized warranty of any conclustions proposed. To offer an analogy with hypothesis testing, mine was a large alpha level.

A 36-item test in arithmetic achievement was administered to two fourth-grade classrooms in a midwestern city. While no covariate was available, discussion with the school principal and the teachers indicated that the pupils had been assigned to their respective classes randomly with respect to academic ability. The test was divided into four sections--simple computations to assess arithmetic relationships, more complex computations, word-problems and arithmetic

concepts. Results for each section were tabulated separately for each class. Without knowledge on these results, both teachers were then asked individually about the amount of feedback time allocated to the contents which they understood as undergirding these items. A study by Raths and Chang gave me confidence that this method of reporting would be useful. This information was then compared with the data obtained on the test.

Several findings were particularly suggestive. First, let us consider the distribution suggested by Haladyne and Roid as representing the expected pattern of post-instructional results for a highly formalized criterion-referenced setting--very negatively skewed due to a ceiling effect (where skewness equals $\bar{z}^3$.) in the shape of what my mathematics colleagues term a first-degree curve. When this distribution was compared with the results of class A for the computation cum arithmetic relationships section, one is struck by the close similarity.

Teacher A subsequently reported that she had devoted the majority of her instructional time, class-wise, to these skills, including administering daily drills beyond those offered in the textbook, with the explicit hope of obtaining precisely this kind of result. Teacher B, on the other hand, reported that she devoted a lesser proportion of her time to these contents providing no drills beyond those afforded by the text, preferring to effect roughly equal coverage over all the topics included in the text. Her expectations were therefore quite different from teacher A with respect to performance on computational skills. The effects of teacher B's strategy may be explained by appealing to her class's distributtion of results. While also skewed negatively, the distribution showed greater variance and a smaller mean than Class A; it also yielded a minor mode in its left-hand tail. A simple relationship between the allocation of time and the attainment of a given level of classroom mastery is suggested. In addition, the apparent constancy of results across all the sub-contents of this section points to a homogenous collection of contents.

Let us compare these results with those obtained on the word-problem section. Both classes yielded leptokurtic (where leptokurtosis equals $\overline{z}_4$), negatively skewed distributions with no significant difference in either mean or variance. It was quickly noticed, however, that the items divided themselves into two distinct groupings according to item difficulty. One group had high difficulty indices ($\geq .8$), indicating the relative ease of their contents. The other group was also homogeneous in the difficulty of its items, but the indices were significantly lower ($\leq .4$).

More interestingly, there seems to be an isomorphism between this psychometrically-based distinction and the two distinct types of word-problem contents which suggested themselves. All the items with high difficulty levels were similar in content in that each unambigously provided only that information necessary to compute accurately a simple computation. For example:

> Mary worked 35 arithmetic problems. If 7 were wrong, how many were correct?

On the other hand, the second group of items was characterized by items in which either extraneous information was provided or additional information had to be inferred from the text of the question. For example:

> How long has Timmy been waiting for Gloria? It is now 3 o'clock. Before we can answer, what else must we know?

I called the first group of items verbalized computations inasmuch as problem-solving skills were lmited to performing a simple computation embedded in a verbalized format. The second group was termed primitive algorithms; problem-solving skills were rquired in order to perform the ensuing computation.

These two group of items were plotted separately for each class. On the one hand, I found that for Class A the verbalized computation results mirrored the distribution obtained by Class A on the computation section. Class B, while

once again yielding a negatively skewed distribution, was characterized by both first and second degree curves. On the other hand, the distributions on the algorithmic subsection results for the two classes were similar to each other, both with respect to leptokurtosis as well as skewness.

Teacher B noted that she had devoted somewhat more time than Teacher A towards the instruction of both verbalized computations and primitive algorithms (this was apparently a direct function of the amount of time which Teacher A had allocated to the basic computational skills while Teacher B was seeking to manage a more equitable distribution of allocation across contents). Teacher A indicated that she expected significant transfer from computational skills to successful performance on the verbalized computations-like items to the extent that she was not directly concerned with the amount of time she allocated to her pupils in the latter area. She accordingly expected results similar to those obtained on basic computational skills. Teacher B, on the other hand, made no such connections between computation and word-problem instructions and expressed no concrete expectations about performance.

Findings on the primitive algorithm sub-section more directly pointed to the extent to which differences within the so-called word-problem contents are important in understanding the impact of the differential allocation of time. Neither teacher could confidently assess the amount of time which she devoted to these contents because, unlike the verbalized computation contents, neither could confidently identify what in fact these contents curricularly or instructionally implied. That is to say, neither teacher had a firm notion of what the subject-matter-to-be-transmitted entailed nor, as a result, what a routinized set of instructional skills adequate to these contents might contain. In addition, neither expressed any firm performance expectations.

The deployment of time with regard to these contents tended to derive from considerations not directly related to the differential expectations of achievement. As a result, therefore, neither teacher believed that varying the amount

of instructional time would necessarily impact on raising or lowering classroom achievement over these contents. In effect, the impact of instructional time could be couched only in generalized terms of absolute instructional inclusion or exclusion. While instruction, no matter how haphazardly conceived for these contents, would be expected to raise the class mean vis a vis no instruction whatsoever, no further refinements on the relationship between time and achievement were voiced. In other words, the nature of the subject-matter was central in constraining the possible alternatives available in varying the deployment of instructional time.

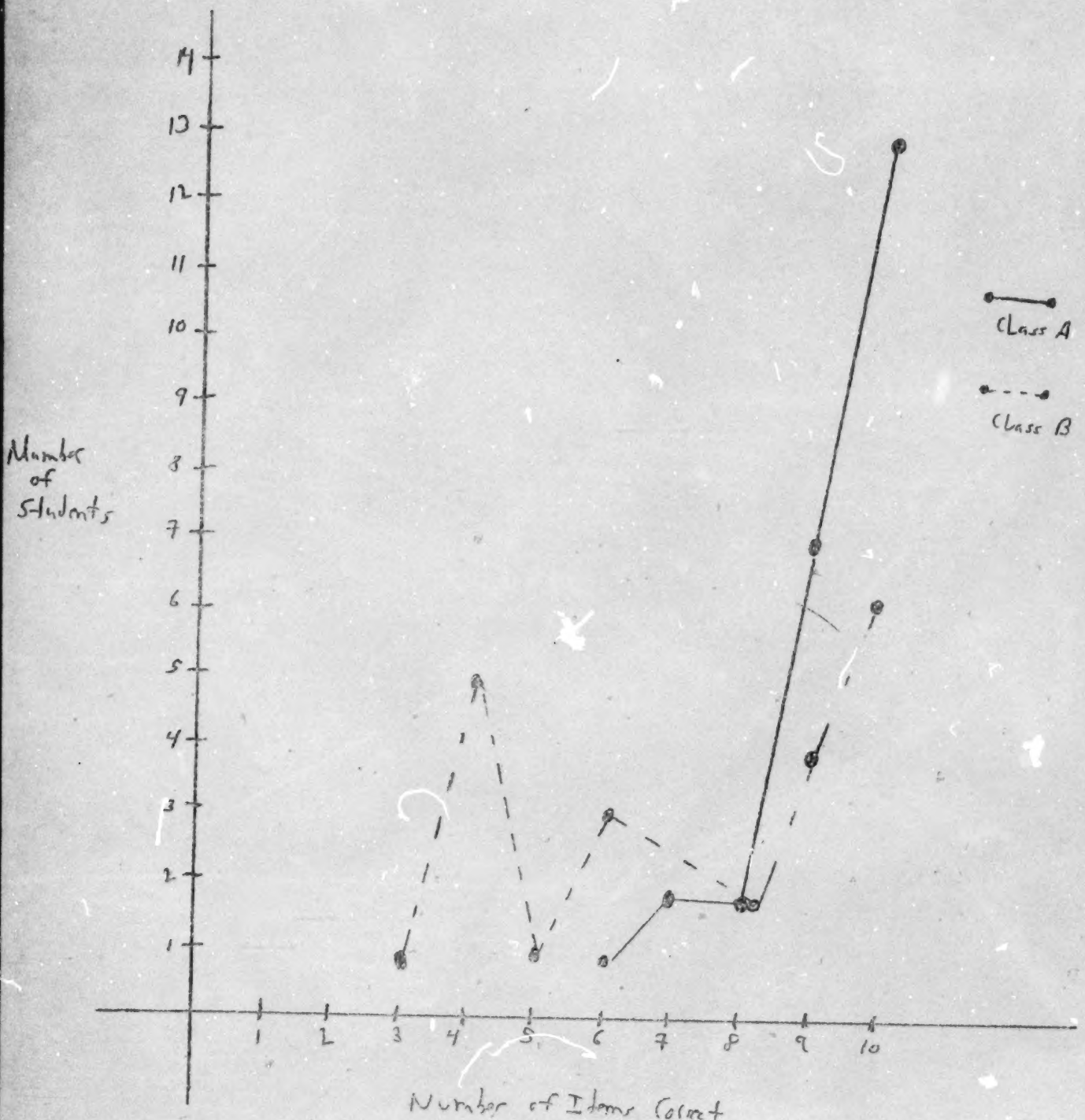
The issue of feedback is similarly conceived. Both teachers indicated that item results, taken either singularly or aggregated, were potentially useful in affecting decisions about the allocation of time. The teacher's particular expectation of classroom performance served as the standard by which this deployment can be calibrated. In the case of teacher A, she in fact chose, on the basis of the data presented, to devote more instructional time to certain more complex computational contents because the results obtained on the test were not consistent with her qualitative goal for these skills. Teacher B, on the other hand, still intended to subordinate the particular distribution of classroom results on a given group of contents to the overiding aspiration of achieving maximal coverage of contents. Even here, however, she admitted that there was in principle a level of computation achievement below which she would re-consider her deployment of time. While that lower level was not breached in this case, the proposed existence of this lower bound underscored her basic intention to modify coverage to allow greater instructional time for certain contents. Coverage is therefore also in the final analysis a decision undergirded by the consideration of the deployment of time.

The character of the feedback was quite different with respect word-problem, particularly algorithmic, results. Both teachers believed that a generalized

exposure to these contents vis a vis no exposure at all, would have an uncertain impact on classroom performance: it would certainly raise the class mean while perhaps skewing the results negatively and more doubtfully reducing the class variance. Beyond the issue of exposure/no-exposure, however, little further could be said the alternative calibrations of time and achievement that might be implied.

In sum, this complex interelationship among curricular subject-matter, time and test suggests the words of Aristotle: "It is a mark of an educated man to look for preciseness in each class of things just so far as the nature of the subject admits."

Let me stress again that this exercise was intended to assess the potential utility of one curricular view of instruction via the heuristic vehicle of the curriculum-in-use. It is therefore clear that what I have presented today is in the profound sense a working paper, to be criticized, modified, and hopefully improved. Perhaps most importantly for myself at this moment is the hope that this approach is "practial." At the very least, I would hope that it might generate some renewed interest in what the practical might mean for sustained curriculum theory and practice.


14
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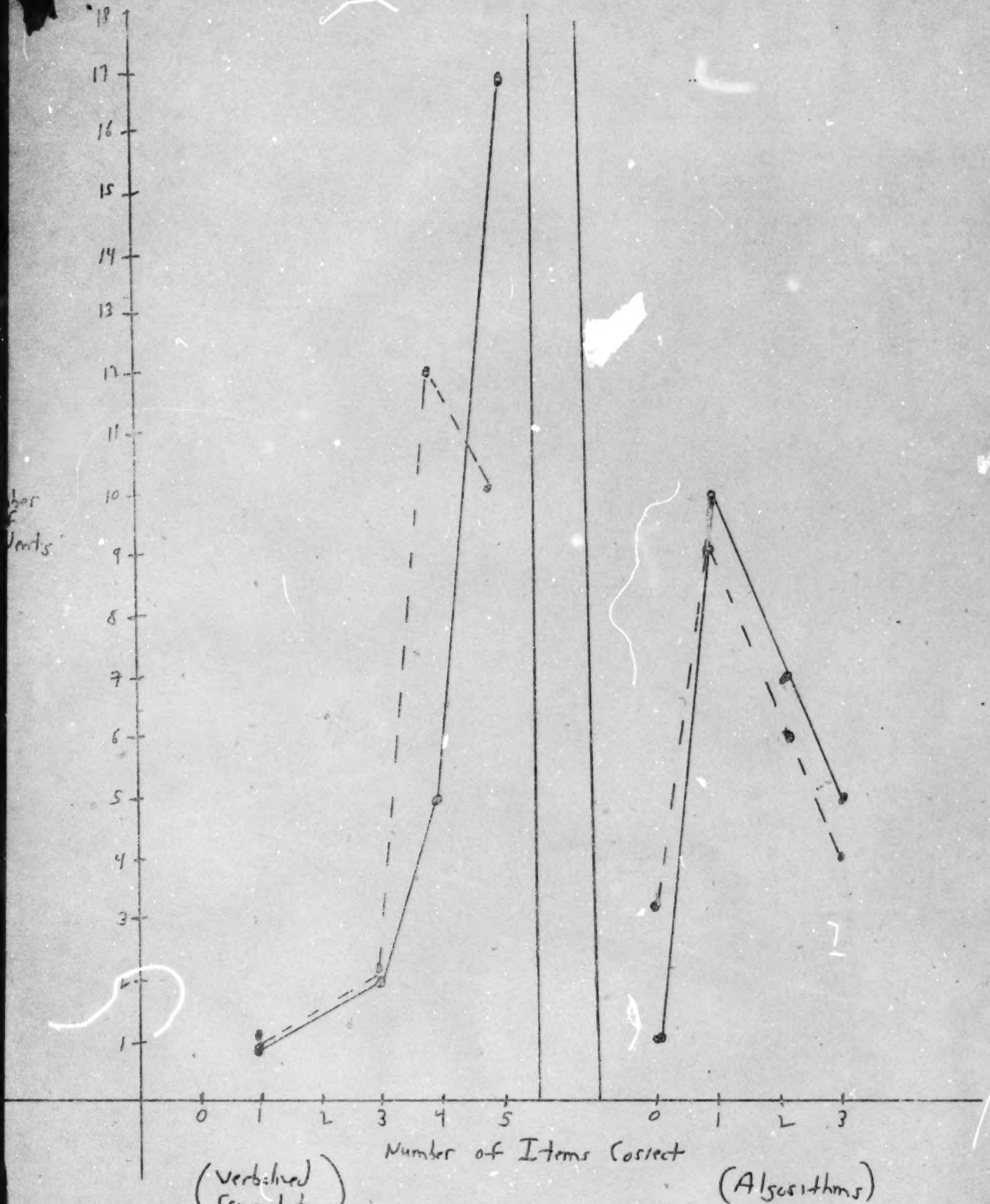
Number of Items Correct
Class A
Class B

GRAPH I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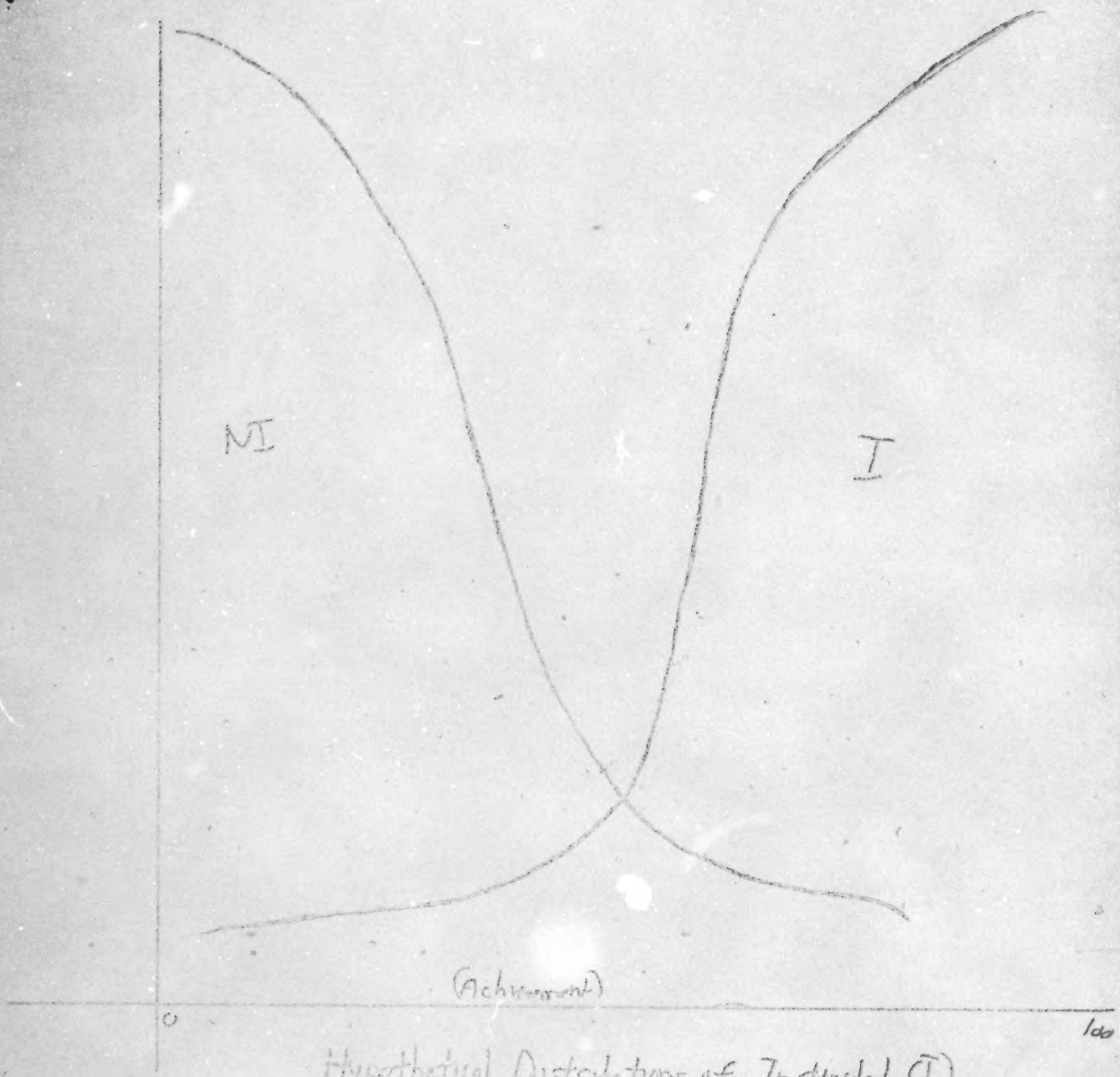
Number of Items Correct
(Verbalized computations)
(Algorithms)

Graph II



Hypothetical Distributions of Instructed (I) and Not-Instructed (NI) Pupils for CR Tests (adapted from Haladyna & Roid - 1978)

Table I